

Osprey



Design Overview

SECDEF Blue Ribbon Panel



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PMA-275



ORD / SPEC History



- JSOR - April 1985
- FSD Specification - SD-572-1 Rev A dtd 02/14/86
- EMD Contract date 10/22/92
- EMD CDR 11/15/94
- JMVX ORD - 03/04/95
 - MLR ORD dtd 09/29/93
 - USSOCOM Multi-Mission Vertical Lift Aircraft ORD dtd 12/06/93
- EMD Specification SD-572-1 Rev C 09/13/95
- JMVX ORD Change 1 - 09/03/99
- JMVX ORD Change 2 - 12/05/00



ORD / SPEC History



REQUIREMENT	2000 JMVX Chng 2	1999 JMVX Chng 1	1995 JMVX	1985 JSOR
Defensive Weapon	✓	✓	✓	X
GCAWS	✓	✓	✓	X
Chaff/Flare Switches in Cabin	✓	✓	✓	X
Interoperability	✓ (1)	✓ (2)	X	X

X - Not in ORD

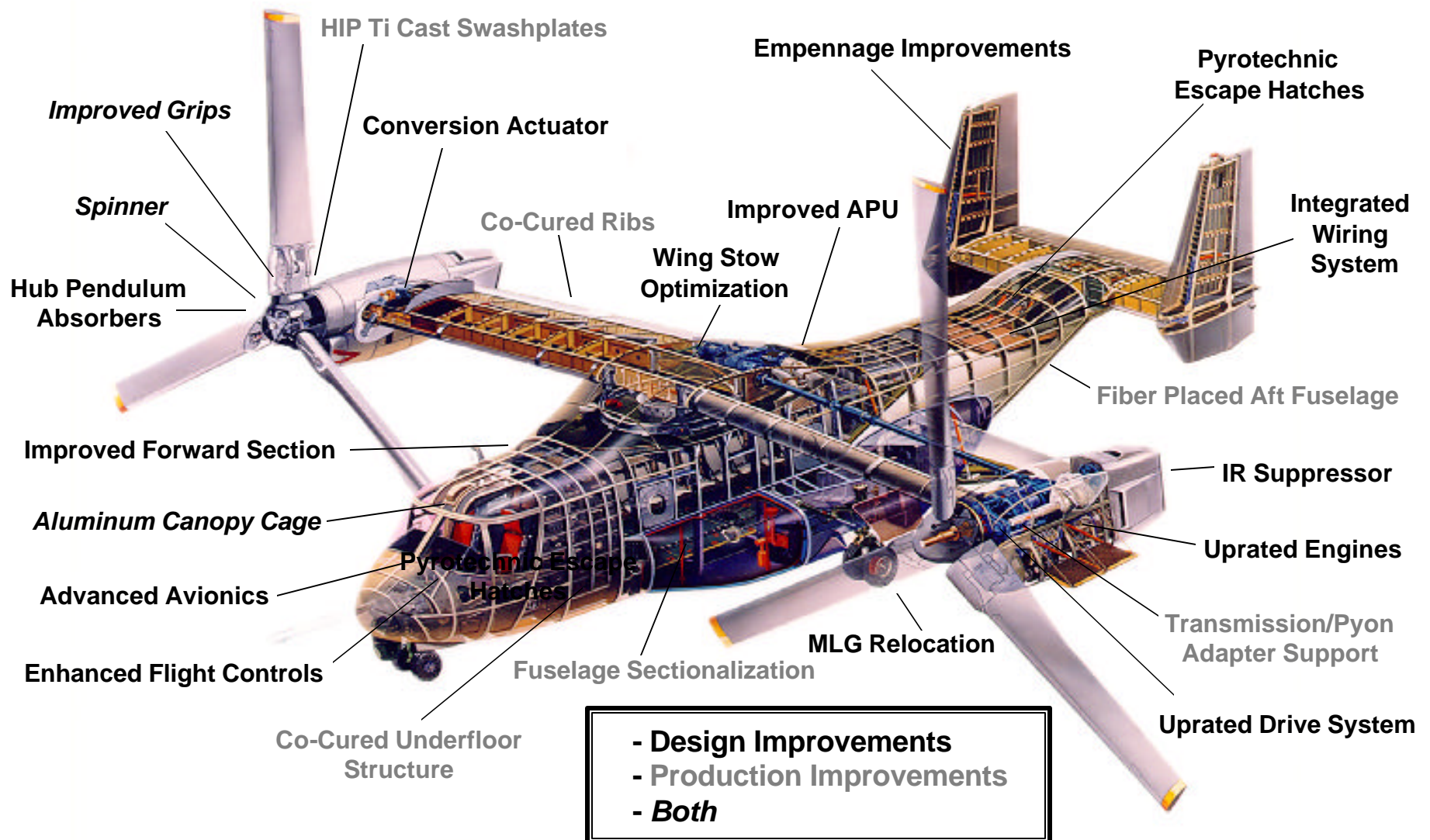
✓ - Included in ORD

(1) Made Interoperability a KPP

(2):must comply with applicable provisions contained in the DoD Joint Technical Architecture to include DII COE compliance.



EMD Improvements



Resulted in 2800 lbs. weight savings⁺



Overall V-22 Design Criteria



- Embark and operate from LHA/LHD in support of OMFTS concept
- Accommodate all present multi-service missions
- Be easily adaptable to all known and future variants (ie. Army, Navy, Air Force, Marines & Coast Guard)



Fuselage Structure



- Optimized combination of advanced metals and composite materials
- Composite graphite/epoxy laminates
 - high strength-to-weight ratio
 - excellent fatigue and corrosion resistance
 - improved ballistic tolerance



Fuselage Structure (con't)



- Cockpit - accommodate 2 MV/3 CV crew
 - antiplow bulkhead
 - emergency escape capability
 - birdstrike protection
- Cabin - accommodate 24 combat troops and 1 crewmember
 - sponsons
 - main landing gear
 - fuel cells
 - ECU



Fuselage Structure (con't)



- Aft - structural transition between cabin and empennage
 - hyd operated ramp/hatch
- Empennage - (tail assembly)
 - vertical and horizontal stabilizers
 - rudders
 - elevator



Wing Assembly



- Wing - wing skin, leading edge panels and supporting structures fabricated from composites
 - Components
 - flaperons
 - ICDS
 - fuel cells
 - nacelle/pylon actuator mounts
 - hard points for wing attachment



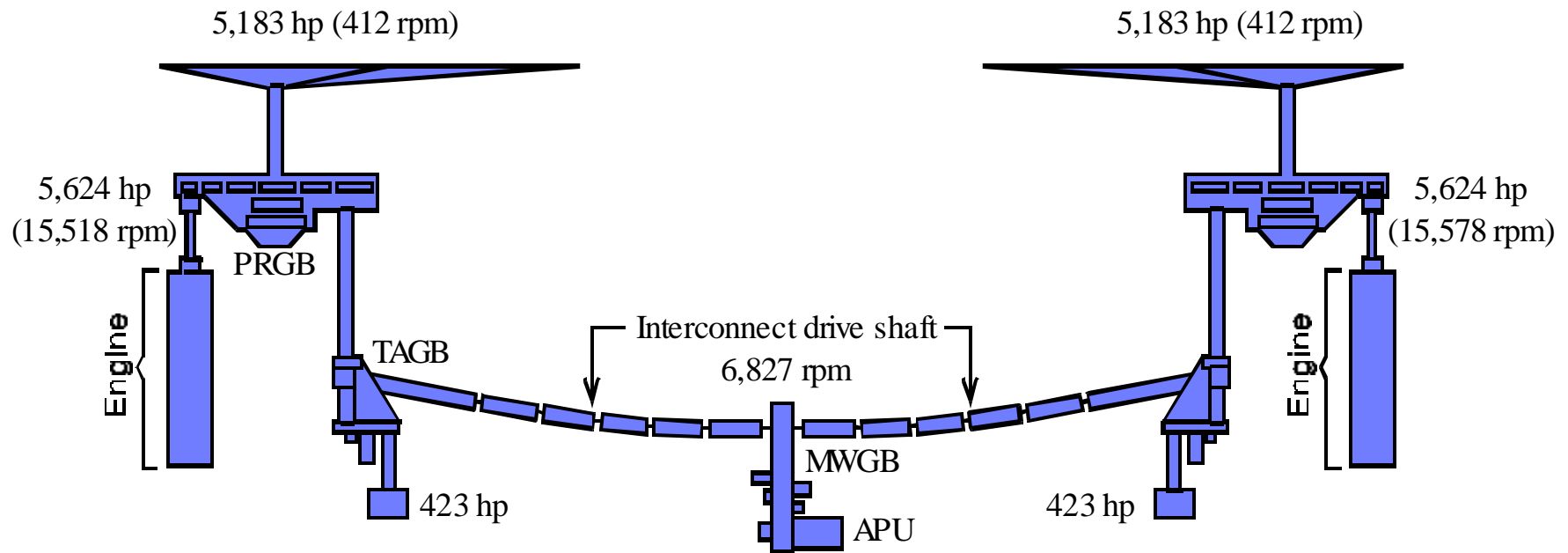
Nacelle Assembly



- houses engine and main transmission
- rotates in the conversion from helicopter to airplane mode and vice versa
- composite nacelle cowls and supporting structure
- contains EAPS and IR Suppressors



Propulsion and Drive System



Twin-Engine Operation



Propulsion and Drive System



- Engines - two 6150 SHP, Rolls-Royce Allison AE 1107C, housed in wing tip nacelles
 - each engine drives a 38' diameter, three-bladed proprotor thru a PRGB
 - PRGB connected by drive shafting to TAGBs
 - TAGBs connected to each other by ICDS



Propulsion and Drive Sys (con't)



- ICDS provides single engine pwr to both proprotors in the event of an engine failure
 - powers MWGB
 - drives two A/C generators, flight-control hyd pump, pneumatic compressor and oil cooling fan
 - rotor brake and rotor positioning unit (located on MWGB)
- APU - drives MWGB systems when engines inop
- A triply-redundant hyd system and triply-redundant hyd motors drive the conversion actuators that transition the acft





Integrated Subsystems



- All subsystems integrated with the avionics sys and can be monitored and/or controlled by the flight crew
 - Flight crew station
 - Avionics
 - Flight controls
 - Electrical system
 - Hydraulic systems
 - Fuel systems
 - Environmental control system
 - Cargo handling system



Flight Crew Station



- Nerve center of acft, designed to reduce pilot workload thru improved human-machine interfaces
 - Fully integrated avionics - thru two digital data processor display control units, the pilot/copilot accesses all acft subsystems and instrument readouts for visual display on the engine instrument crew alerting system (EICAS)
 - Symmetrical side-by-side layout - instrument displays and controls, and acft subsystem controls are symmetrically mounted on pilot/copilot console, fwd console and overhead console



Avionics



- Provides capabilities for comm, nav, identification, data processing, electronic countermeasures, various types of sensors, systems controls, instruments, and displays
- Comm - provides clear/secure voice, data transmissions and reception of radio signals on AM/FM-UHF/VHF freqs selected by the pilot or copilot. SATCOM is also provided
 - provides audio comm for crew and troop commander; connection for ground crew



Avionics (con't)



- Nav - sys supplies data such as position, heading, alt., geographic frame velocities, magnetic variation, and radar altitude
 - Appropriate data items are displayed on the digital map
 - sys receives bar alt, CAS, and temp data to calculate TAS, windspeed and wind direction
- Data processing - redundant processing thru primary and B/U mission computers
- Surveillance - AN/APQ-27 FLIR
- TFTA Radar - CV-22



MV-22 Defensive Avionics



- AN/APR-39A(V)2 radar signal detecting set
- AN/AVR-2A laser detecting set
- AN/AAR-47 missile warning system
- AN/ALE-47 countermeasure dispensing system



Flight Control System



- Digital fly-by-wire
- Triply redundant
- Fully integrated with FADEC
- Helo mode - conventional tandem helicopter flight controls
- Conversion mode - transitions from helicopter flight controls to conventional airplane flight controls
- Airplane mode - flaperon, rudder and elevators



Electrical System



- Redundant power generation system capable of producing up to 240 kVA
 - 2 CFGs - 40 kVA each
 - 2 VFGs - 50/80 kVA each
 - 3 regulated converters
 - one 24 amp-hour lead acid battery



Hydraulic Systems



- Consist of 3 independent 5,000 PSI systems
 - systems 1&2 are identical dedicated flt control systems
 - system 3:
 - serves as a b/u to certain flt control systems
 - provides ground check pressure to flt control actuators
 - provides pressure to power utility systems



Fuel System



- Designed to satisfy diverse multiservice radius requirements
- Basic fuel system
 - 2 feed tanks (1,200 lbs total)
 - 2 fwd sponson tanks (6,500 lbs total)
- Additional fuel tanks
 - 1 aft right sponson (2,150 lbs total)
 - 8 wing tanks (4,000 lbs total)
 - 2 cabin aux tanks (10,900 lbs total)
- Refueling capability - press, gravity or aerial



Environmental Control System



- ECU - provides filtered air for cockpit/cabin heating and cooling and pressure differential for NBC protection
- Avionics cooling system - provides dry filtered outside ambient air; cooling fans provide for ground, hovering and low-speed ops
- OBOGS - provides O₂ for aircrew
- OBIGS - supplies N₂ to displace O₂ laden air in the fuel tanks